

Description of IWPS for MPO - Heat Treating

The industrial wastewater pretreatment system (IWPS) associated with the company's metal heat treating operation incorporates three primary methods of treatment including pH neutralization, particulate filtration, and ion exchange.

Rinse waters from the heat treatment line's acid rinse tank and quench tank flow into the first and second compartments (sections), respectively, of a three-section, flow-through pH neutralization system. Each tank section has a capacity of approximately 175 gallons and is separated from other sections by a baffle. Each of the three sections incorporates a separate pH meter/controller with feeds to respective chemical metering pumps. The pH of rinse water from the dilute acid rinse tank typically ranges between pH 2-3 but can be lower while that of the quench water ranges between pH 6-8. Both waste streams are neutralized using 50% sodium hydroxide (NaOH) and 50/50 hydrochloric acid (HCl) solutions, as needed. Treatment chemicals are dispensed from 55-gal drums using separate chemical metering pumps. The system is designed with the capability of introducing treatment chemicals into all three tank sections. A pH probe located downstream from tank section 3 records the final pH on a 7-day circular chart recorder upon discharge from the system.

Tank sections 1 & 2 utilize separate 10 micron quad-cartridge filters to remove larger particulates from within each respective section. A separate recirculation pump and piping system installed in each tank recirculates wastewater through these in-tank filter units.

In addition to pH adjustment and in-tank particulate removal, neutralized wastewater is pumped from tank section 3 through a series of two inline, canister-type filter units, each fitted with 5-micron filter bags. The pre-filtered wastewater is then passed through an ion exchange unit. Deionized water is recirculated back to the tank section 1 where pre-treatment continues. Treated wastewater discharges from the tank section 3 to an adjacent flow metering pit before exiting through the facility's Main Plant Outfall (MPO).

Description of IWPS – MPO - Water Soluble Coolant Recovery/Oil Separation

Smith & Wesson recovers water soluble coolant from its parts machining operations for reuse in those same operations. Coolant containing tramp hydraulic and other machining oils is processed in oil separation units. Separated oil is transferred to a 1,000 gallon above ground oil storage tank prior to off-site recycling/disposal. Recovered coolant is either reused or reconstituted using fresh coolant prior to reuse within the facility. The portion of coolant that cannot be reclaimed is transferred to a 3,000 gallon holding tank.

The pretreatment system consists of two ultra-filtration units designed to process spent materials generated from two main sources; that portion of unrecoverable water soluble coolant that also contains low levels of tramp hydraulic and other oils and dilute aqueous alkaline cleaning solutions from parts-cleaning tanks located throughout the main facility. Both sources are collected and pumped to the 3,000 gallon holding tank referenced earlier. A portion of the tank contents is pumped to a separate 2,200 gal holding tank. Each holding tank feeds a separate ultra-filtration unit. Each unit has a rated process flow of 1 gal/min. The resulting filtrate from both units is collected and piped to the Pollution Control Facility treatment system where it is combined with the alkaline rinse stream at the 1,000 gallon first-stage pH adjustment tank. This waste stream is further treated in the Pollution Control Facility pre-treatment system. The final treated effluent from the Pollution Control Facility IWPS discharges to the sewer via the Pollution Control Outfall (PCO).

Description of IWPS – PCO - Tumbler Operation

Part of the manufacturing process requires certain machined parts to be polished. Polishing takes place in tumblers utilizing both solid and aqueous-based polishing media. This process generates a dilute, slightly acidic (pH 3-4) aqueous wastewater stream. Wastewater is collected from each tumbler unit and is subsequently conveyed through a collection manifold to a 2,000 gal capacity polyethylene holding tank. The wastewater is batch-treated (typical one batch each day) by first pumping the contents to a polyethylene treatment tank of equal volume. The wastewater is mixed and lime is added manually by hand to raise the pH to within a range of pH 7-9. Fifty-pounds of calcium chloride are then added and the tank is allowed to continue to mix. The contents are pumped to a plate and frame filter press where the solids are removed. The resulting filtrate is collected and piped to the Pollution Control Facility where it is combined with the alkaline rinse stream at the 1,000 gallon first-stage pH adjustment tank. This waste stream is further treated in the Pollution Control Facility pre-treatment system. The final treated effluent from the Pollution Control Facility IWPS discharges to the sewer via the Pollution Control Outfall (PCO).

Description of IWPS – PCO - Pollution Control Facility

This industrial wastewater pretreatment system (IWPS) uses conventional treatment methods including hexavalent chromium reduction, neutralization, solids conditioning, settling, and filtration using a plate and frame filter to treat rinse waters generated primarily from the company's plating and metal finishing operations. It also accepts approximately 3,000 gals/day of pre-treated filtrate from the water soluble coolant/oil separation ultra-filtration units and 2,000 gals/day of filtrate from the tumbler room wastewater pre-treatment operations. Both of these minor sources enter the alkaline side of the system.

Acidic and alkaline rinse waters from the plating and metal finishing operations are collected separately and piped to separate areas of the IWPS. Acidic rinses are directed to a 750-gallon below-grade treatment tank/pit where pH adjustment using diluted (<50%) sodium hydroxide solution and polymer addition take place. Alkaline rinses undergo a two-stage pH adjustment using different concentrations of sulfuric acid. First stage neutralization takes place in a 1,000 gallon pH adjustment tank where concentrated sulfuric acid is added to lower the pH. Filtrate from the Water Soluble Coolant Recovery ultra-filtration process along with filtrate from the Tumble Operation plate-and-frame filter press is introduced into the Pollution Control Facility treatment system at this 1,000 gallon tank. The partially-neutralized wastewater then flows to a second 750-gallon below-grade treatment tank/pit where diluted sulfuric acid solution is added to complete pH adjustment. Rinse water from plating/finishing operations containing hexavalent chromium undergoes an initial hexavalent chromium reduction step in a separate process prior to introduction into the acid rinse wastewater stream ahead of the acid rinse pH neutralization tank/pit.

Following pH adjustment, the contents from each 750-gallon pH adjustment tank/pit are pumped to a separate Lamella® inclined plate clarifier/settling unit. pH adjusted wastewater from the acid rinse stream is dosed in-line with additional polymer and flash-mixed ahead of that clarifier. Solids settled from both clarifier units are transferred to a separate tank where further settling occurs. The water fraction from the sludge settling tank is decanted and re-introduced ahead of the acid rinse stream pH adjustment tank/pit while the settled sludge is pumped to a conventional plate and frame pressure filter for solids removal. Filtrate from the plate and frame filter press is also reintroduced back into the acid rinse stream ahead of the pH adjustment tank/pit. Treated wastewater from the Lamella units is collected and piped to a metering pit located in a separate building adjacent to the Pollution Control Facility where final pH and flow measurements are taken prior to discharge to the sewer via the Pollution Control Outfall (PCO) outfall.